

TWO NEW RECORDS OF THE GENUS *HEPTACARPUS*
(CRUSTACEA: DECAPODA: HIPPOLYTIDAE)
FROM JAPANESE WATERS

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Abstract.—Two species of the hippolytid genus *Heptacarpus*, *H. maxillipes* (Rathbun, 1902) and *H. moseri* (Rathbun, 1902), both of which have been known mainly from the eastern Pacific Ocean including the Bering Sea, are recorded from Japan for the first time on the basis of specimens collected from the Pacific coast of northern Japan. The identification was confirmed by comparison with American specimens. For each species, a synonymy and detailed description, including the color pattern of fresh material, are given.

The hippolytid genus *Heptacarpus* Holmes now contains 33 species, which are all restricted to the North Pacific Ocean. Hayashi (1992) reported 11 species from Japan and its adjacent waters, all from littoral or sublittoral zones.

Recent collections from the Pacific coast of northern Japan revealed the presence of two bathyal species of *Heptacarpus*, *H. maxillipes* (Rathbun, 1902) and *H. moseri* (Rathbun, 1902). These two species have been reported from the eastern Pacific including the Bering Sea (Rathbun 1902, 1904; Butler 1980), and *H. maxillipes* has been reported near Kurile Islands (Birshtein & Zarenkov 1970). Since descriptions of these two species by the previous authors are inadequate, I describe them herein in detail.

The following abbreviations are used in the text: CL, postorbital carapace length; HUMZ, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Heptacarpus maxillipes (Rathbun, 1902)
Figs. 1A, 2, 3

Spirontocaris maxillipes Rathbun, 1902:
898.—Rathbun, 1904:92, fig. 40.

Heptacarpus maxillipes.—Holthuis, 1947: 12 (list).—Birshtein & Zarenkov, 1970: 420.—Hayashi, 1979:12, tab. 1.—Hayashi, 1992:110, tab. 32.

Material examined.—HUMZ-C 936, East of Cape Erimo, 42°02.3'N, 144°07.9'E, 915–970 m, 6 Sep 1989, otter trawl (T/S *Oshoro-Maru*), 1 female (5.5 mm CL), coll. T. Komai; HUMZ-C 1003, off Fukushima Pref., 37°07.5'N, 142°41.2'E, 412 m, 1 Jun 1989, otter trawl (R/V *Tanshu-Maru*), 2 females (6.8 mm CL), coll. O. Yamamura.

Comparative material.—USNM 183004, Aleutian Islands, 2 males (5.1, 5.2 mm CL), 1 female (7.0 mm CL).

Description.—Integument thin, smooth. Rostrum (Fig. 2A) slightly curved upward, reaching or slightly overreaching distal end of antennular peduncle, 0.86–0.89 times as long as carapace, with ventral blade rather deep and dorsal blade poorly developed; lateral carina axis-like, sharply ridged proximally; apex sharply pointed; dorsal margin with 6 teeth over entire length, including 2 on carapace posterior to orbital margin, posteriormost tooth situated at anterior $\frac{1}{4}$ of carapace; ventral margin convex, with 4 small teeth on distal $\frac{2}{5}$. Carapace (Figs. 1A, 2A, B) with suborbital lobe rounded from dorsal aspect, falling far short of antennal

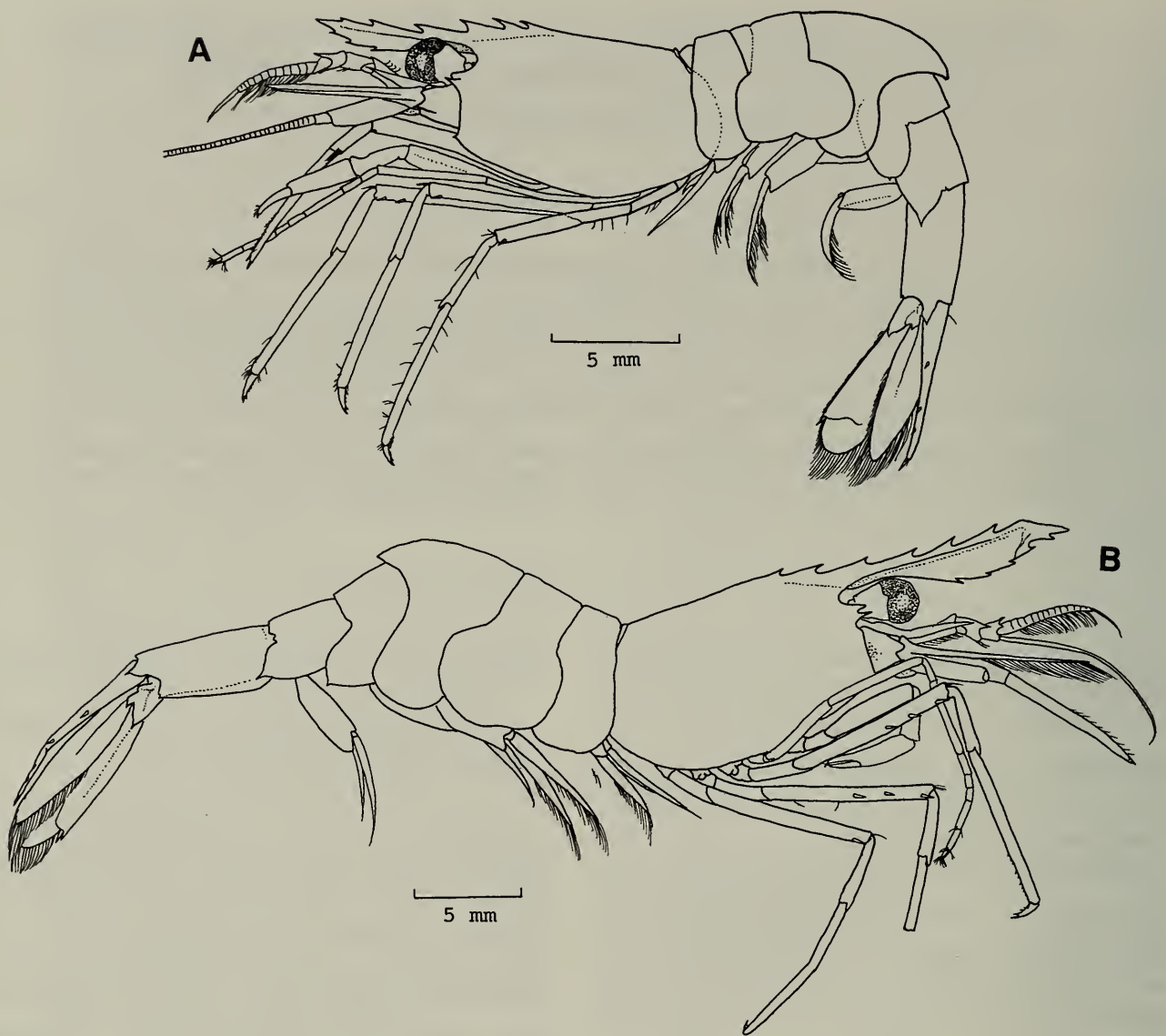


Fig. 1. A, *Heptacarpus maxillipes* (Rathbun, 1902), HUMZ-C 1003, female, 6.8 mm CL, entire animal; B, *Heptacarpus moseri* (Rathbun, 1902), HUMZ-C 1056, female, 9.6 mm CL, entire animal.

tooth; pterygostomian tooth small; postrostral median carina becoming obscure just behind posteriormost median tooth.

Abdominal somites (Figs. 1A, 2C) without carinae or dorsal teeth, not strongly geniculate. Pleuron of fourth somite with weak tooth at posteroventral angle. Sixth somite 0.7 times as long as carapace and 2.1–2.9 times as long as proximal depth. Telson (Fig. 2D) 0.9 times as long as carapace, 3.4 times as long as proximal width, lateral margins of anterior $\frac{1}{4}$ subparallel, remaining $\frac{3}{4}$ tapering to convex posterior margin; dorsal surface slightly convex, armed with 3 pairs of dorsolateral spines and 3 pairs on posterior margin.

Cornea (Fig. 2A, B) fairly large, strongly dilated, without ocellus.

Antennule (Fig. 2A, B) with peduncle reaching at least to distal $\frac{1}{4}$ of scaphocerite, proximal segment longer than distal 2 segments combined, without teeth on distal margin; stylocerite sharp, falling slightly short of distal margin of proximal segment; intermediate segment longer than wide, with strong dorsolateral tooth; distal segment also longer than wide, with dorsodistal tooth. Outer flagellum with proximal aestetasc bearing portion composed of 10 or 11 thickened articles. Inner flagellum slender, slightly longer than outer flagellum.

Antenna (Fig. 2A, B) with carapocerite

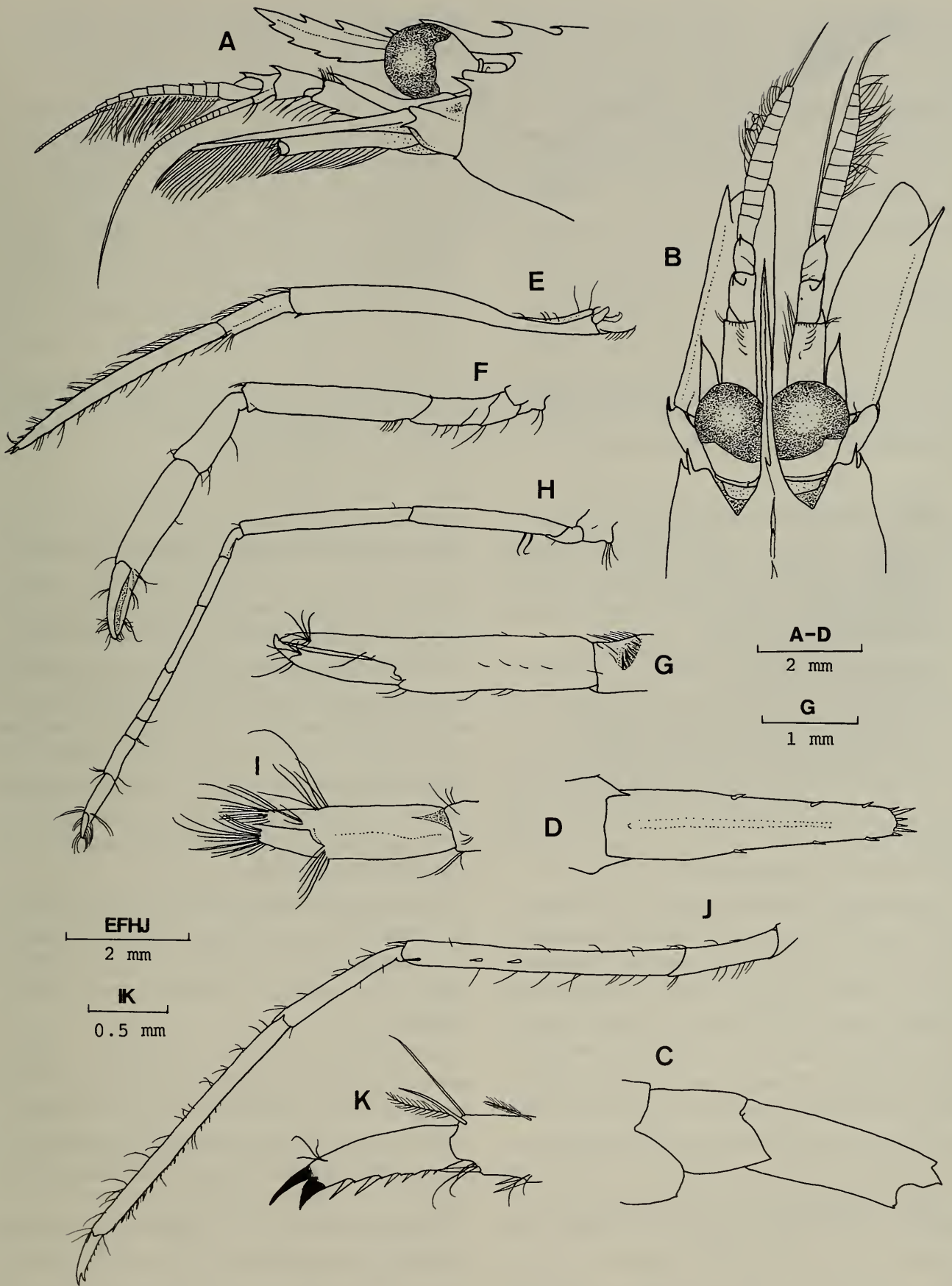


Fig. 2. *Heptacarpus maxillipes* (Rathbun, 1902). HUMZ-C 936, female, 5.5 mm CL. A, anterior carapace, rostrum, and cephalic appendages in left aspect; B, same in dorsal aspect; C, posterior three abdominal somites in left aspect; D, telson in dorsal aspect; E, left third maxilliped; F, left first pereopod; G, same, chela in extensor aspect; H, left second pereopod; I, same, chela in extensor aspect; J, left third pereopod; K, same, dactylus in lateral aspect.

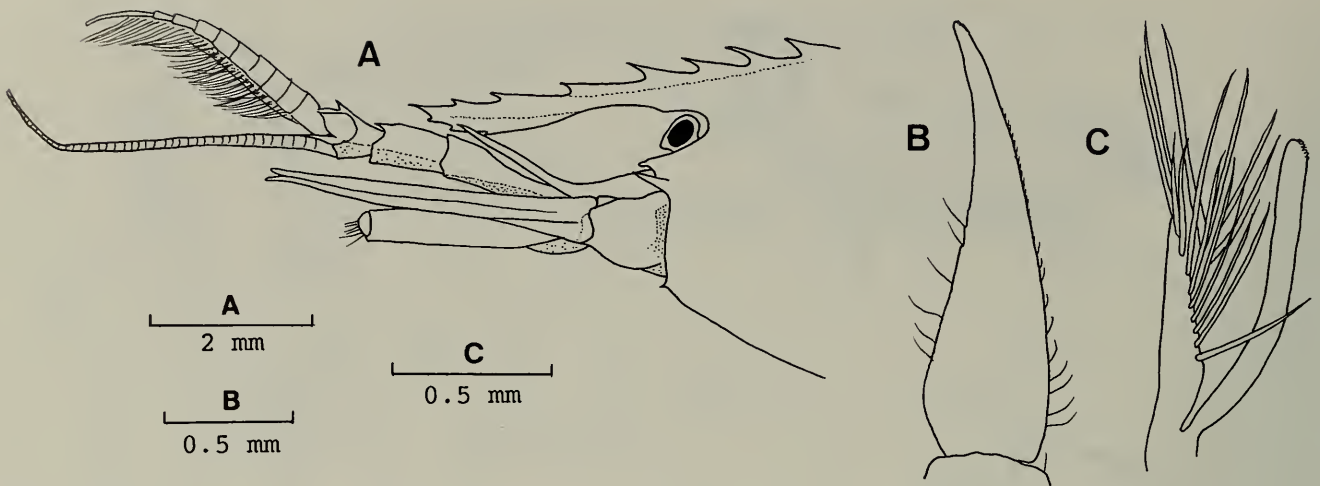


Fig. 3 *Heptacarpus maxillipes* (Rathbun, 1902). USNM 183004, male, 5.2 mm CL. A, anterior carapace, rostrum, and cephalic appendages in lateral aspect, eye removed; B, endopod of first pleopod in dorsal aspect; C, appendix interna and appendix masculina of second pleopod in dorsomesial aspect.

reaching distal $\frac{2}{5}$ of scaphocerite. Scaphocerite 0.80–0.82 times as long as carapace, 3.2 times as long as wide; lateral margin almost straight, distolateral tooth falling somewhat short of blade.

Mouthparts typical of genus. Third maxilliped (Fig. 2E) long and relatively thin, overreaching scaphocerite by length of distal $\frac{4}{5}$ of ultimate segment; ultimate segment 3.3 times as long as carpus, mesial surface with numerous clusters of stiff setae, and tipped with 5 or 6 corneous spines; coxa with epipod; exopod absent.

Pereopods without epipods. First pereopod (Fig. 2F) fairly stout, overreaching distal end of scaphocerite by length of distal $\frac{1}{3}$ of chela; dactylus (Fig. 2G) 0.7 times as long as palm; palm 2.7 times as long as wide; carpus about half length of chela; merus 6.1 times as deep as long, unarmed. Second pereopod (Fig. 2H) somewhat longer than first pereopod, slender, overreaching scaphocerite by length of chela and distal three articles of carpus; dactylus and fixed finger (Fig. 2I) thickly setose distally, dactylus about half length of palm; carpus composed of 7 articles, second and third articles 1.6 times and 2.3 times as long as first article respectively. Third to fifth pereopods relatively long, almost similar morphologically. Third pereopod (Fig. 2J) overreaching scaphocerite by length of dactylus and almost all of

propodus; dactylus (Fig. 2K) 0.2 times as long as propodus, bifid terminally, with 5 or 6 accessory spinules over entire length of flexor margin; propodus with 2 rows of spinules on flexor margin; carpus 0.47 times as long as propodus; merus with 3 lateral spines in distal half. Fourth pereopod overreaching scaphocerite by length of dactylus and distal $\frac{3}{4}$ of propodus; merus with 1 or 2 lateral spines in distal $\frac{1}{4}$. Fifth pereopod overreaching scaphocerite by length of dactylus and distal half of propodus; merus with 1 subterminal spine.

First pleopod with endopod conventional. Uropod (Fig. 1A) with endopod slightly overreaching tip of telson; exopod slightly longer than endopod, lateral margin nearly straight.

Coloration.—In fresh condition, entire animal transparent with red dots over entire body, devoid of distinct band or pattern. Distal spines of third maxilliped, tip of fingers of first chela and tip of dactylus of last three pairs of pereopods dark brown.

Biological note.—The three specimens examined were collected from muddy bottom of the continental slope at a depth ranging from 412 to 970 m. The female specimens collected off Fukushima have well-developed ovaries which are visible through the carapace.

Remarks.—Birshtein & Zarenkov (1970)

recorded for the first time *Heptacarpus maxillipes* from the Western Pacific (off Kurile Islands), but they did not give description or figures of their specimens. I compared the present three female specimens with one female and two male specimens from the Aleutian Islands deposited at the USNM, and I could not find any significant differences between the Japanese and Aleutian specimens. Rathbun (1904) gave the proportional length of scaphocerite to the carapace as "about two-thirds," but the ratio varies considerably, 0.63–0.81 in the Aleutian specimens, and 0.80–0.82 in the Japanese specimens. Further, Rathbun (1902, 1904) described the proportional length of rostrum to the carapace as "about four-fifths," but the ratio of the Aleutian specimens examined here is 0.88 in the female and 0.63 and 0.69 in two males; the ratios of the two Japanese specimens in which the rostra are intact are 0.89 and 0.94 respectively. The apparently short rostrum in the male (Fig. 3A) may be ascribed to the sexual difference, since sexual dimorphism in length of the rostrum has been reported in other hippolytids (e.g., Greve 1963, Hayashi 1979, Criales 1992).

Other than the proportionate length of the rostrum, the males differ from the females in the following points: the rostrum is much shallower than in the female (Fig. 3A); the outer and inner antennular flagella are somewhat longer than in the female (Fig. 3A); the endopod of the first pleopod (Fig. 3B) is slightly longer than half of the exopod and tapers gradually to a simple tip; the distal portion bears adhesive hooks; the mesial margin is fringed with minute bristles; the appendix interna of the second pleopod (Fig. 3C) is more slender, and more strongly curved than in the female; and the appendix masculina (Fig. 3C) is about two-thirds of the appendix interna, and is armed with about 16 long spines.

Heptacarpus maxillipes belongs to the group having epipods only on the maxillipeds, and three Japanese species, i.e., *H. camtchaticus* (Stimpson, 1860), *H. genicu-*

latus (Stimpson, 1860), and *H. pandaloides* (Stimpson, 1860), have been assigned to this group (Hayashi 1979, 1992). *Heptacarpus maxillipes*, however, is distinguished immediately from them by the moderately stout body, the rostrum shorter than the carapace, the eye lacking an ocellus, the scaphocerite distinctly shorter than the carapace, and the long pereopods.

In addition, Wicksten (1990) presented a key to the hippolytid shrimp of the Eastern Pacific Ocean, but she omitted *H. maxillipes*. *Heptacarpus maxillipes* is inserted into Wicksten's key as follows:

- 56. Scaphocerite shorter than carapace 56a
- Scaphocerite as long as or longer than carapace 57
- 56a. Rostrum longer than carapace; telson shorter than sixth abdominal somite; third maxilliped not overreaching scaphocerite
..... *H. decorus* (Rathbun)
- Rostrum shorter than carapace; telson longer than sixth abdominal somite; third maxilliped overreaching scaphocerite
..... *H. maxillipes* (Rathbun)

Distribution. — *Heptacarpus maxillipes* was recorded from the Aleutian Islands at depths of 418 to 1144 m by Rathbun (1904), and was recorded subsequently from the Pacific side of Kurile Islands at depths of 280 to 1580 m by Birshtein & Zarenkov (1970). The present report corroborates the occurrence of this poorly known species in the Western Pacific Ocean, and extends further its range to the west and south.

Heptacarpus moseri (Rathbun, 1902)
Figs. 1B, 4

Spirontocaris gaimardii. — Rathbun, 1899: 556 (in part).

Spirontocaris moseri Rathbun, 1902:897. — Rathbun, 1904:91, fig. 39. — ? Hart, 1930: 104.

Eualus moseri. — Makarov, 1941:126.

Heptacarpus moseri.—Holthuis, 1947:21 (list).—Birshtein & Vinogradov, 1953: 216.—Hayashi, 1979:12, tab. 1.—Butler, 1980:223, pl. 6A.—Wicksten, 1990:595 (key).—Hayashi, 1992:110, tab. 32.

Material examined.—HUMZ-C 1056, off Hiroo, Hokkaido, 42°11.45'E, 143°41.6'E, 325 m, 30 May 1990, otter trawl (R/V *Tan-shu-Maru*), 1 female (9.6 mm CL), coll. T. Komai.

Comparative material.—USNM 183092, southwest of East Cape, Attu Island, 52°55'40N, 173°26'E, 247 m (*Albatross Station* 1906: 4784), 5 females (7.3–8.7 mm CL).

Description.—Integument thin, smooth. Rostrum (Fig. 4A) (injured on distal part) horizontal in general, reaching distal end of scaphocerite, 1.16 times as long as carapace, with deep ventral blade and poorly developed dorsal blade; lateral carina axis-like, proximal half sharply ridged; apex sharply pointed; dorsal margin with 7 teeth over entire length, including 2 on carapace posterior to orbital margin, posteriormost tooth situated at about anterior $\frac{1}{3}$ of carapace; ventral margin convex, with 5 small teeth on about distal half. Carapace (Figs. 1B, 4A, B) with suborbital lobe rounded from dorsal aspect, falling far short of antennal tooth; pterygostomian tooth rather strong; post-rostral median carina becoming obscure just behind posteriormost median tooth.

Abdominal somites (Fig. 1B) without carinae or dorsal tooth, not strongly geniculate. Pleuron of fourth somite with weak tooth at posteroventral angle. Sixth somite 0.7 times as long as carapace and 1.9 times as long as proximal depth. Telson (Fig. 4C) 0.9 times as long as carapace, 4.2 times as long as proximal width, lateral margins of anterior $\frac{1}{3}$ subparallel, remaining $\frac{2}{3}$ tapering to convex posterior margin; dorsal surface slightly convex, armed with 5 pairs of dorsolateral spines and 3 pairs on posterior margin.

Cornea of eye (Fig. 4A, B, D, E) large,

strongly dilated; ocellar sinuosity distinct, but not forming true ocellus; mesial face of ocular peduncle considerably swollen proximally.

Antennule (Fig. 4A, B) with peduncle reaching middle of scaphocerite; proximal segment much longer than distal 2 segments combined, without teeth on distal margin; stylocerite sharp, reaching beyond middle of intermediate segment of peduncle; intermediate segment longer than wide, with strong dorsolateral tooth; distal segment as long as wide, with strong dorsodistal tooth. Outer flagellum with proximal aestetasc bearing portion composed of about 20 thickened articles. Inner flagellum slender, about twice length of outer flagellum.

Antenna (Fig. 4A, B) with carpocerite falling slightly short of middle of scaphocerite. Scaphocerite 0.94 times as long as carapace, 4.0 times as long as wide; lateral margin almost straight, distolateral tooth falling somewhat short of blade.

Mouthparts typical of genus. Third maxilliped (Fig. 4F) stout, overreaching scaphocerite by length of distal half of ultimate segment; ultimate segment 2.9 times as long as carpus, mesial surface with numerous clusters of stiff setae, and tipped with 4 or 5 corneous spines; coxa with epipod; exopod absent.

Pereopods with epipods on first pair. First pereopod (Fig. 4G) stout, falling slightly short of scaphocerite; dactylus (Fig. 4H) half length of palm, palm 3.0 times as long as wide; carpus 0.6 times as long as chela; merus 4.4 times as long as deep, unarmed. Second pereopod (Fig. 4I) much longer than first pereopod, slender, overreaching scaphocerite by length of chela and distal 3 articles of carpus; dactylus and fixed finger (Fig. 4J) thickly setose distally, dactylus 0.8 times as long as palm; carpus composed of 7 articles, second and third articles 1.3 and 2.3 times as long as first article respectively. Third to fifth pereopods relatively long, almost similar morphologically. Third pereopod (Fig. 4K) overreaching scaphocerite by

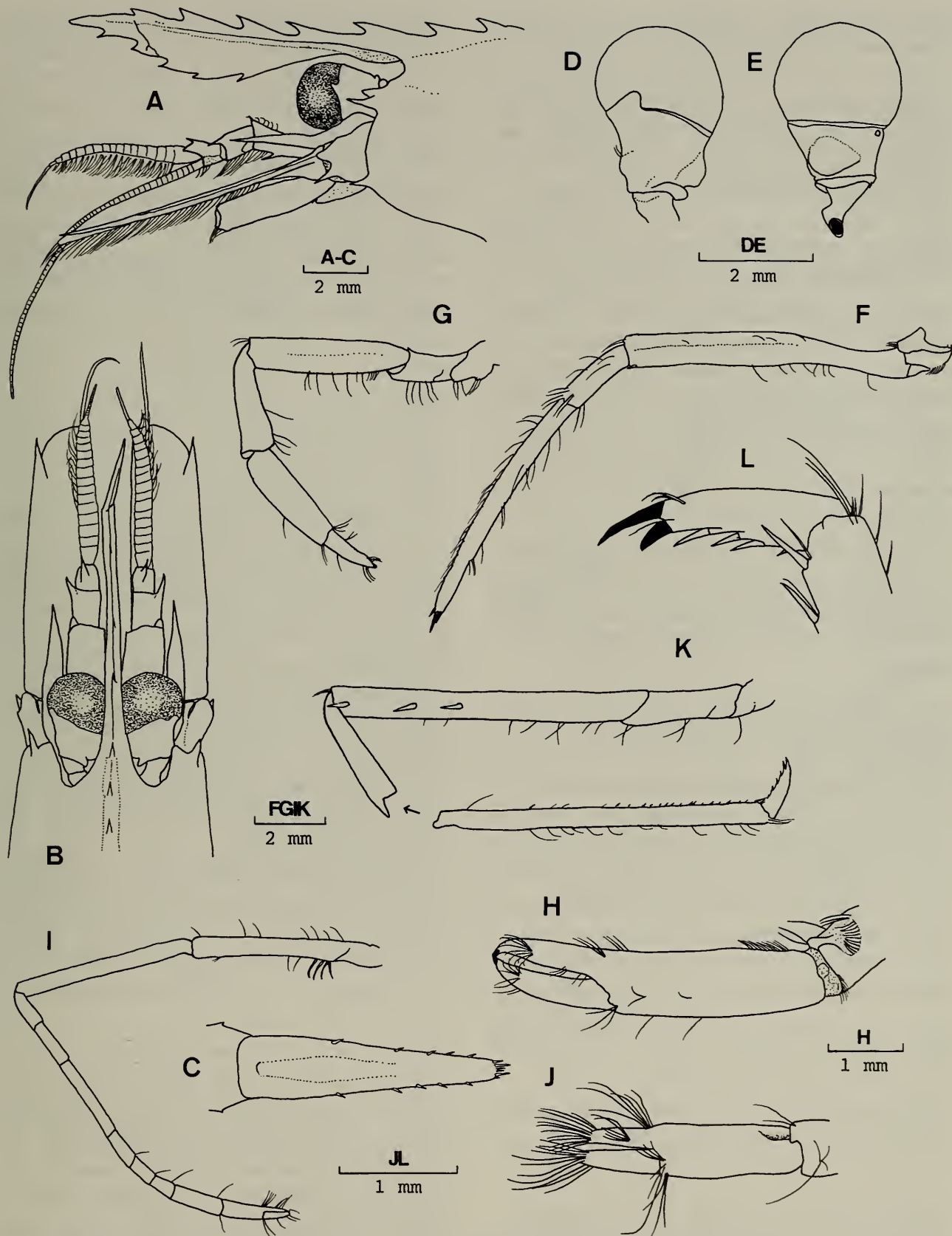


Fig. 4. *Heptacarpus moseri* (Rathbun, 1902). HUMZ-C 1056, female, 9.6 mm CL. A, anterior carapace, rostrum, and cephalic appendages in lateral aspect; B, same in dorsal aspect; C, telson in dorsal aspect; D, eye in dorsal aspect; E, same in mesial aspect; F, left third maxilliped; G, left first pereopod; H, same, chela in extensor aspect; I, left second pereopod; J, same in extensor aspect; K, left third pereopod; L, same, dactylus in lateral aspect.

length of dactylus and distal half of propodus; dactylus (Fig. 4L) 0.19 times as long as propodus, bifid terminally, with 4 or 5 accessory spinules over entire length of flexor margin; propodus with 2 rows of spinules on flexor margin; carpus 0.36 times as long as propodus; merus with 3 lateral spines in distal half. Fourth pereopod overreaching scaphocerite by length of dactylus and distal $\frac{1}{3}$ of propodus; dactylus 0.18 times as long as propodus, with 5 or 6 accessory spinules; carpus 0.39 times as long as propodus; merus with 3 lateral spines. Fifth pereopod overreaching scaphocerite by length of dactylus; dactylus 0.19 times as long as propodus, with 5 accessory spinules; carpus 0.36 times as long as propodus; merus with 3 lateral spines.

First pleopod with endopod conventional. Uropod with endopod (Fig. 1B) distinctly overreaching tip of telson; exopod slightly longer than endopod, lateral margin nearly straight.

Coloration.—In life, body entirely reddish with translucent background. Abdomen having wide dark red band on each somite. Third maxilliped white except mesial surface of distal two segments colored with dark red. First and second pereopods nearly colorless. Last three pairs of pereopods with ischium and merus bearing red bands on white background; distal three segments dark red. Each protopodite of pleopods having white spot on lateral side; uropod red in distal half, exopod with two fine white spots at distal portion and base of distolateral spine respectively.

Biological note.—The present specimen was trawled on a muddy bottom at a depth of 325 m, where the temperature was +1.9°C.

Remarks.—This single female specimen was compared with the specimens identified as *H. moseri* from off Attu Island, Aleutian Islands, and deposited at the USNM. No significant difference was observed. Although Rathbun (1904) gave the propor-

tionate length of scaphocerite to the carapace as “five-sevenths” (=ca. 0.71) measured along the lateral margin, the ratio is 0.88–0.90 (0.89–0.94 in total length) in all the examined specimens. Dr. F. A. Chace, Jr. of the USNM informed me that a proportionate ratio of the scaphocerite was actually 0.73 in the illustrated specimen from the type lot of *H. moseri*. It is suggested that the ratio varies considerably from 0.73 to 0.94 in *H. moseri*. Butler (1980) gave the proportionate length of rostrum to the carapace as 0.8–1.0, and that of dactylus to the propodus as 0.24 in the third pereopod and 0.23 in the fourth pereopod. In the specimens examined here, the proportionate ratio of the rostrum to the carapace is 1.0–1.2, and those of dactylus to the propodus of the pereopods 0.19–0.20 in both the third and fourth pereopods. These differences are so identical or so slight that they could be within the range of variation of the species. Further, Butler (1980) indicated the presence of a ridge on the inner margin (=face?) of the ocular peduncle. In the specimens examined here, no ridge-like structure is apparent, but a swelling is observed on the inner face of the ocular peduncle. Butler’s term “ridge” may indicate this swelling.

Rathbun (1904) stated that “Specimens from the two southernmost localities show a tendency to differ from the types,” though she combined them then. The identity of the southern population still remains unsettled. Hart’s (1930) record of *H. moseri* from the intertidal zone of Vancouver Island still remains somewhat in doubt, since the color pattern of the living animals described by her differs noticeably from that described by Butler (1980:224) and that of the present specimen. It is likely that her specimens belong to the closely related species *H. littoralis* Butler, 1980, which is distributed along the American coast from Baranof Island, Alaska to Seattle, Washington, at depths of 0–18 m (Wicksten 1990).

In the Western Pacific Ocean, *H. moseri*

is the only species belonging to the group having epipods only on the first pereopod in addition to the maxillipeds.

Distribution.—*H. moseri* has been known from the Bering Sea to Destruction Island, Washington (Wicksten 1990) and has a very wide bathymetric range from the intertidal zone to a depth of 1100 m (Butler 1980). The present specimen represents the first record of this species from the Western Pacific Ocean, as well as from Japanese waters.

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